this does not occur except under unusual causative conditions, entailing considerable variation in air pressure in the nasopharynx, especially sneezing and blowing the nose. As a test in this matter three pupils, with dry persistent drumhead perforations, had the affected ears tightly stopped with plugs of cotton and lard, and then dove five times successively from a springboard, four meters above the water, the middle ears remaining dry. In conclusion Dr. Shin lays stress upon the importance of preliminary and successive aural examinations in all swimming-school pupils, and advises even those with sound ears to use some measure of protection from the possibility of a furuncular infection.

HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF
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The Purification of Water by Anhydrous Chlorine.—C. R. DARNELL (*Jour. Amer. Pub. Health Assoc.*, November, 1911, i, 783) states that anhydrous chlorine possesses considerable advantages over the hypochlorites, which have been used rather extensively for the purification of water during the last few years. Ordinarily chlorine is introduced into water as hypochlorite of lime. Although the hypochlorite treatment of water has been successful, there are certain disadvantages attending the use of hypochlorites for this purpose. The hypochlorites are unstable compounds and the content of available chlorine is rather uncertain, necessitating frequent chemical examinations in order to determine the quantity to be used. Another objection in the use of hypochlorites is the fact that more or less troublesome dosing devices must be used. It has also been noticed that a relatively slight excess of hypochlorites may impart a disagreeable taste and unpleasant odor to the water. Chlorine is obtained in considerable quantities, at the present time, as a by-product in the manufacture of caustic soda. This chlorine is purified, dried, liquefied by pressure, and placed on the market in steel drums or cylinders. Chlorine so obtained is practically chemically pure, containing merely traces of oxygen, carbon dioxide, and nitrogen. It is necessary in marketing chlorine in this form to remove all water vapor in order to prevent corrosion of the steel used in the construction of the storage drums. The price of this liquefied chlorine varies from ten to fifteen cents per pound. Water at ordinary temperature will absorb about 4000 parts per million, by weight, of chlorine. It will be readily seen that this property of chlorine is of considerable importance in water purification, since it makes it unnecessary to use elaborate mixing devices which would be the case were the chlorine not so easily soluble. In general it may be stated that an average unfiltered river water will require about one-half of a part, by weight of chlorine gas per million parts of water, to bring about a satisfactory bacterial purification. In other words, it will require from three to four pounds of liquefied chlorine per million gallons of water. Darnell has invented a relatively simple automatic apparatus for the introduction and mixing of chlorine gas with water. This apparatus occupies but a small space, and, judging from the results obtained by its use, is efficient. The important advantages which this method of applying dry chlorine gas has over the use of hypochlorites may be summarized briefly as follows: For cities already having aqueducts and the necessary water supply it is possible to disinfect large amounts of water in a plant occupying little space. A mixing chamber 16 inches in diameter and 24 feet long, for example, has a capacity of 750,000 gallons per day. To purify the water of greater New York, 750,000,000 gallons per day, 16 mixing chambers 10 feet in diameter and 200 feet long would be sufficient. This would occupy about one acre of ground. The cost of labor for operating such a plant would be trifling. The cost of the chlorine would range, roughly speaking, from 35 to 50 cents per million gallons of water. In comparing this with other purification methods Darnell points out that anhydrous chlorine and ozone have practically the same efficiency. The chlorine method, however, is cheaper to operate and rather more reliable because there is no complicated electrical machinery necessary. It also requires less labor. When we compare chlorine and hypochlorites, we find that the advantage of chlorine over hypochlorites consists first in the uniform composition of chlorine, contrasting, in a noteworthy manner, with the variability of the hypochlorites; second in the relatively small amount of apparatus which is required for adding chlorine to the water supply. Finally, in contrasting chlorine and filtration, it may be noted that a chlorine purifying plant is cheaper to install than a filter plant, and it is cheaper to operate because the labor required is much less. It should be stated that in the chlorine method provision must be made for clarifying the water before the chlorine is added, so that it will usually be necessary to have preliminary sedimenting reservoirs or mechanical filters, for the chlorine in no way clarifies a turbid water.

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